CLAIMS

1. An image display device comprising:

an optoelectric element of emitting light in a two-dimensional way that has a display surface orthogonal to a direction of emitted light flux; and

a fisheye-type optical system that projects light flux emitted from the optoelectric element inside at least one of eyeballs of a user and has an viewing angle of 60 degrees and over,

wherein the image display device is worn in front of the eyeball,

wherein the fisheye-type optical system forms an intermediate image,

wherein a closest optical element of optical elements arranged toward the eyeball from an position of forming the intermediate image to the eyeball is an aspherical optical element of a single lens element,

wherein a far surface shape of the optical element from the eyeball has a aspherical shape of a surface such that light flux entering a pupil of the eyeball enters a far surface of the optical element from the eyeball approximately at right angles and,

wherein a Conic coefficient of the Conic surface is less than -1.

2. The fisheye-type optical system set forth in claim 1, wherein a second optical element of optical elements constituting the image display device from the eyeball is made up of a single lens element and a far surface of the optical element from the eyeball has a shape such that the light flux entering the pupil of the eyeball enters a far surface of the optical element from the eyeball approximately at right angles.

3. The image display device set forth in claim 1, wherein the fisheye-type optical system has a first lens group that includes a relay optical system and an eyepiece lens system that projects the intermediate image formed by the

first lens group inside the eyeball.

4. The image display device set forth in claim 3, wherein the first lens group includes at least one or more aspheric optical element and over.

5. The image display device set forth in any of claim 3 or 4, wherein the first lens group includes at least one curved mirror that corrects telecentricity.

6. The image display device set forth in claim 1 further comprising:

an image composite device that composites first image information and second image information different from the first image information and outputs information of the composite image to the optoelectric element.

7. The image display device set forth in claim 6, wherein the image composite device includes a function that, when light flux emitted from the optoelectric element is influenced by distortion produced by the fisheye-type optical system, implements image process of giving distortion to at least one of the first image information and the second image information to correct the distortion beforehand such that a faithful image can be projected on a user.

8. The image display device set forth in any of claims 6 through 7, wherein the image composite device includes an image composite device controller that controls information of the composite image to be output to the optoelectric element such that an area of compositing at least one of the first image information and the second image information, and another image information does not overlap beyond a predetermined area.

9. The image display device set forth in any of claims 6 through 8, wherein at least one of the first image information and the second image information includes information of at least one of images output from a video, a DVD and a high vision.

10. The image display device set forth in any of claims 6 through 8, wherein at least one of the first image

information and the second image information includes image information output from a processing computing device.

11. The image display device set forth in claim 10, wherein the processing computing device is connected with a keyboard to enter desired information into the processing computing device and the image output information includes information input to the keyboard.

12. The image display device set forth in claim 11, wherein the keyboard is a portable keyboard attached to a hand.

13. The image display device set forth in claim 12, wherein the portable keyboard includes an electromagnetic element attached to a thumb and an electromagnetic detecting sensor attached to other fingers, and further includes a control device that recognizes information of a distance and direction between the thumb and the other fingers from a state of an electromagnetic field detected by the electromagnetic detecting sensor and gives a specific sign corresponding to the information of the distance and direction.

14. The image display device set forth in claim 12, wherein the portable keyboard includes a pressure detecting sensor that is attached to each finger, and a control device that gives a specific sign on a basis of information of each finger's pressure detected by the pressure detecting sensor.

15. The image display device set forth in claim 10, wherein the processing computing device converts a voice sound or a non-voice sound input to a microphone or a headphone into a specific sign corresponding to the sound and outputs an image in correspondence to the specific sign as the image output information.

16. The image display device set forth in claim 1, wherein the fisheye-type optical system includes an optical image composite device that optically composites a plurality of images output from a plurality of optoelectric elements and forms, and projects a plurality of the images on the

retina inside the eyeball.

17. The image display device set forth in claim 16, wherein the optical image composition device includes an optical zoom device that has a variable magnification of at least 2X and over with respect to a single image, and an optical image composite device controller that controls the optical zoom device such that an area of compositing the single image and other image does not overlap beyond a predetermined area.

18. An image display device for both eyes, wherein the image display device set forth in claim 1 is separately arranged to a right eyeball and a left eyeball respectively and further includes an adjustment device that is capable of adjusting a space between each fisheye-type optical system of right and left eyeballs corresponding to a space between eyeballs of the user.

19. An image display device for both eyes, wherein the image display device set forth in claim 1 includes a splitting optical system that splits light flux emitted from one of the optoelectric elements into a plurality of light flux and the fisheye-type optical system that is separately arranged every each split light flux, and further includes an adjustment device that is capable of adjusting a space between each fisheye-type optical system corresponding to a space between eyeballs of the user.

20. The image display device set forth in claim 1, wherein the image display device is arranged to at least one of a right eyeball and a left eyeball.

21. An image display device for both eyes, wherein the image display device set forth in claim 1 includes both of the optoelectric element and the fisheye-type optical system respectively and an image splitting/image composite optical device that splits each light flux emitted by the two optoelectric elements for a right eyeball and a left eyeball and composites the split light flux emitted from a different optoelectric element for a right eyeball and a left eyeball respectively, and a switching member that

switches the image splitting/image composite optical system between a state of an in-operation and a state of an out-of-service.

22. The image display device set forth in claim 1 further comprising:

at least one of an earthquake detecting sensor, a level measuring/level adjustment device, and a fixed device.

23. The image display device set forth in claim 1 further comprising:

a timer device; and

a movement device that moves the image display device in accordance with the timer device or an output of the timer device.

24. The image display device set forth in claim 1, wherein an angle of divergence of light flux traveled from the intermediate image to the eyeball from the intermediate image has a larger angle than a scope of varying angles of incidence of all principle rays passing through a centre of a pupil of the eyeball upon the surface of forming the intermediate image when a position of a pupil of the eyeball varies due to a lateral shift of the eyeball.

25. The image display device set forth in claim 1 further comprising:

a light diffusion element that diffuses light at a position of forming the intermediate image or in proximity to its position.

26. The image display device set forth in claim 25, wherein the light diffusion element is a transparent diffusion substrate coated on a transparent substrate with a particle of a metal oxide or a metallic carbide with a particle diameter controlled by an order of a micron.

27. The image display device set forth in claim 26, wherein the particle is at least one of silicon carbide, chromic oxide, tin oxide, titanium oxide, magnesium oxide and aluminum oxide and the transparent diffusion substrate is a polyester film.

28. The image display device set forth in claim 1, wherein

a part of the image display device is capable of being placed at a contact with a face of a user and further at least the optoelectric element and the fisheye-type optical system are supported by a supporting member rather than a user and its supporting member supports an unit including the optoelectric element and the fisheye-type optical system movably in response to a movement of a user's face.

29. The image display device set forth in claim 28, wherein the supporting member is capable of moving around toward directions of six axes at will.

30. The image display device set forth in claim 28, wherein a position of centre of gravity of the image display device or its proximity to the position is supported by the supporting member.

31. The image display device set forth in claim 28, wherein the supporting member includes a plurality of articular structures members and weight members, and a flexible linking member that links the unit including the fisheye-type optical system and the optoelectric element to the weight member, and a holding member that is arranged at the articular structure members and holds the linking member, wherein the linking member has low friction against a movement of the linking member.

32. The image display device set forth in claim 1 further comprising:

a reducing device of a sickness in Virtual Environment that detects an image of a moving landscape like a flowing landscape and processes the image such that the image looks still during a predetermined period of time.

33. The image display device set forth in claim 32 further comprising:

a selection device that selects use or non-use of the reducing device of the sickness in Virtual Environment.

34. The image display device set forth in any of claim 32 or 33, wherein the reducing device of the sickness in Virtual Environment divides the image into an edge image

block and a centre image block and computes an amount of a lateral shift in an image within each block during a predetermined period of time and judges that there is a hand shake or a lateral movement of an screen when an image of the edge image block and an image of the centre image block shift toward the same direction, and processes an image in such a way that makes a whole screen thereof look still by shifting the entire image by the same amount as a movement amount toward a direction opposite a direction of a moving image such that an image does not move laterally during a predetermined period of time.

35. A projection optical system that is arranged in front of a user and projects an image on an eyeball of a user, and has an angle of view of 60 degrees and over, wherein a closest optical element of optical elements constituting the projection optical system to the eyeball is an aspherical optical element of a single lens element and a far surface shape of the optical element from the eyeball has an aspherical shape of a Conic surface such that the light flux incident upon a pupil of the eyeball enters a far surface of the optical element from the eyeball approximately at right angles and a Conic coefficient of the Conic surface is less than -1.

36. The projection optical system set forth in claim 35, wherein a second optical element of optical elements constituting the projection optical system from the eyeball is made up of a single lens element and a far surface shape of the optical element from the eyeball has a shape such that the light flux incident upon a pupil of the eyeball enters a far surface of the optical element from the eyeball approximately at right angles.

37. The projection optical system set forth in claim 36, wherein the aspherical optical element is arranged at a position closest to the eyeball.

38. The projection optical system set forth in any of claim 35 through claim 37, wherein an angle of divergence of light flux traveled from the image to the eyeball from

the image is larger than a scope of varying angles of incidence of all principle rays passing through a centre of a pupil of the eyeball upon the surface of forming the image when a position of a pupil of the eyeball varies due to a lateral shift of the eyeball.

39. An image display device comprising:

an optoelectric element of emitting light in a two-dimensional way that has a display surface orthogonal to a direction of emitted light flux;

a fisheye-type optical system that projects light flux emitted from the optoelectric element inside at least one of eyes of a user and that has an viewing angle of 60 degrees and over, wherein the image display device is worn in front of the eyeball and the fisheye-type optical system forms an intermediate image and a light diffusion element is arranged at a position of forming the intermediate image or in proximity to the position and at least one of optical elements arranged toward the eyeball from the position of forming the intermediate image is an aspherical optical element of which at least one surface has an aspherical shape of a Conic surface, further comprising:

a supporting member that supports at least the fisheye-type optical system and the optoelectric element movably so as to follow a user's movement.